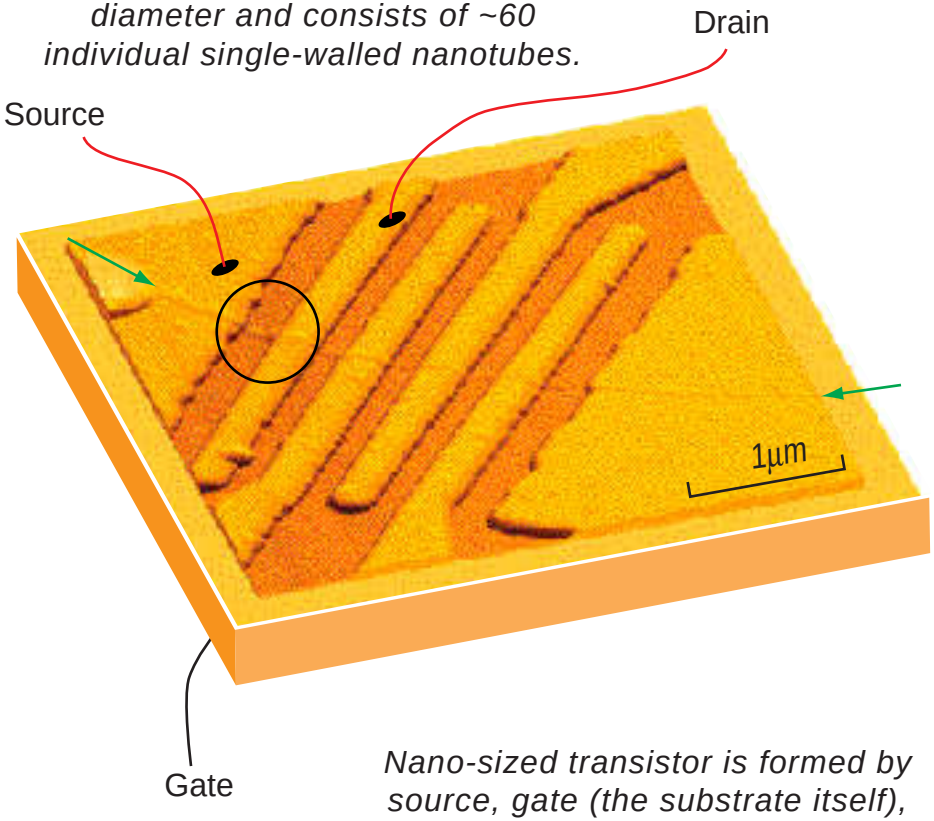
"Nanotransistors" Fabricated and Characterized

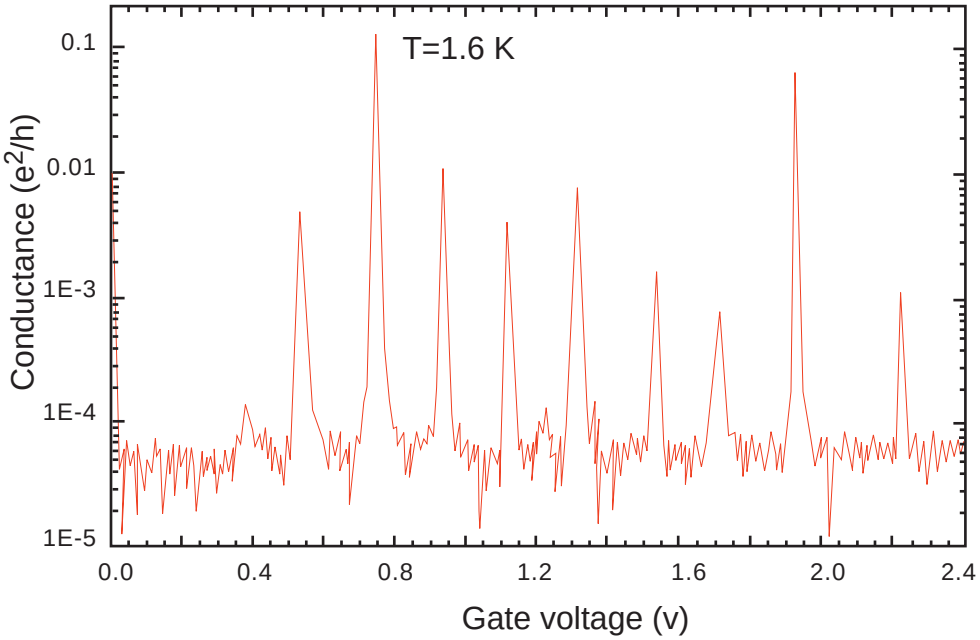
Observed Electronic Effects Attributed to Single Electron Events

Atomic force microscope image of single nanotube rope (green arrows) with electrical contacts: Nanotube rope is 12 nm in diameter and consists of ~60 individual single-walled nanotubes.



Nano-sized transistor is formed by source, gate (the substrate itself), and drain contacts to indicated portion of nanotube rope (circled). The current between the source and drain contacts is measured as a function of gate voltage.

Conductance as a function of gate voltage



Conductance is low due to "Coulomb blockade" in which the presence of a single electron "blocks" another electron in passing. At periodic values of V_g, "resonant effects" overcome the blockage and the conductance is higher. This demonstrates that nanotubes/robes behave like "quantum dots."

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